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PSYCHOMETRIC PROPERTIES OF THE MOTIVATIONAL CLIMATE INVENTORY IN PHYSICAL EDUCATION: A CONFIRMATORY FACTOR ANALYSIS

PSIHOMETRIČNE ZNAČILNOSTI VPRAŠALNIKA ZA MERJENJE MOTIVACIJSKE KLIME PRI POUKU ŠPORTNE VZGOJE: KONFIRMATORNA FAKTORSKA ANALIZA

Abstract

Motivational climate which determines situational goal structure can be comprehended as a joint goal orientation of individuals sharing the same learning environment or situation. There are two basic patterns of motivational climate, namely learning oriented climate and performance oriented climate. Papaioannou (1994) developed a *Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ)* based on Ames' (1992) comprehension of the motivational climate. LAPOPECQ assesses pupils' perception of goal orientations during physical education classes. The aim of this research was to examine the psychometric characteristics of the Slovenian version of LAPOPECQ. 171 pupils (39% boys, 61% girls) from different primary and secondary schools took part in the study. The results of factor analysis showed that the factor structure of the Slovenian version closely fits the structure of the original version of LAPOPECQ. The instrument consists of five factors measuring teachers' behaviours, pupils' satisfaction with learning, climate with clear-normative based criteria, climate with clear-ability based criteria and pupils' worries about mistakes. The results show that the Slovenian version of LAPOPECQ is a reliable and metrically suitable instrument for assessing the motivational climate in the context of physical education.

Key words: achievement orientation, motivation, motivational climate, physical education, psychometric characteristics

Izvleček

Motivacijska klima določa situacijsko ciljno strukturo, ki jo lahko pojmujemo tudi kot skupno ciljno orientacijo posameznikov v določenem učnem okolju ali situaciji. Obstajata dva temeljna vzorca motivacijske klime: klima, usmerjena k učenju in razvoju spretnosti, ter klima, usmerjena k izražanju superiorne izvedbe in doseganju rezultata. Na podlagi Amesovega (1992) pojmovanja motivacijske klime je Papaioannou (1994) razvil vprašalnik *Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ)*, ki meri učenčevo zaznavanje ciljnih orientacij pri urah športne vzgoje. Namen članka je ugotoviti psihometrične karakteristike slovenske priredbe instrumenta. V študiji je sodelovalo 171 učencev iz različnih osnovnih in srednjih šol (39 % dečkov, 61 % deklic). Rezultati faktorske analize so pokazali, da se faktorska struktura slovenske različice instrumenta v veliki meri sklada z originalno. Vprašalnik ima pet faktorjev, ki merijo učiteljevo vedenje, zadovoljstvo učencev z učenjem, uspeh definiran z normativnimi kriteriji, uspeh definiran s sposobnostmi ter zaskrbljenost zaradi napak. Rezultati kažejo, da je slovenska različica LAPOPECQ zanesljiv in metrijsko ustrezen instrument za merjenje motivacijske klime v kontekstu športne vzgoje.

Ključne besede: ciljna orientacija, motivacija, motivacijska klima, športna vzgoja, psihometrične karakteristike

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Introduction

Numerous researches in sport setting (e.g. Biddle, 1999; Duda, 1992, 1993; Roberts, 1993; Newton & Duda, 1999) as well as in the physical education setting (e.g. Ames, 1992; Papaioannou, 1994, 1998; Papaioannou & Goudas, 1999) have revealed the existence of two major goals, namely ego and task. These two dispositional factors differentiate between individuals in terms of their goal perspective decisions and reflect two distinct theoretical approaches to a subjective definition of success, failure and self-assessment of demonstrated competence (Lochbaum & Roberts, 1993; Newton & Duda, 1999). These goal orientations have been found to be mutually orthogonal (Newton & Duda, 1999; Roberts, 1993). There are several synonymous terms of task and ego orientations, namely, learning versus performance orientation (e.g. Christodoulidis, Papaioannou, Digelis, & Laparidis, 2001; Papaioannou, 1994, 1998), and mastery versus ability criteria of performance (Ames, 1984, in Roberts, 1993; Goudas, 1998; Theboom, De Knop, & Wiess, 1995).

When a task or learning goal predominates, an individual is concerned with how to accomplish a meaningful task that will lead to greater gains in personal competence, feel satisfied when they develop new skills and ascribe high value to effort. In a task learning climate mistakes are seen as part of the learning process and competence is perceived as self-referenced (Sarrazin & Famose, 1999). The subjective experience of improvement of one's performance over time by mastering the demands of a task is the criterion underlying the subjective success. Since more effort leads to more learning, the feeling of effortful accomplishment results in a feeling of competence.

When an individual's goal is to achieve high capacity, progress and effort are not enough. This leads to differentiation of conception (ability as capability) because the individual has to be sure that he or she is evaluating the ability and not the effort or task difficulty (Sarrazin & Famose, 1999). In predominantly ego- or performance-oriented climate, an individual is concerned with how good he/she is in a particular task. Perceptions of demonstrated competence depend on external criteria (the performance and effort made by others) and a normative or peer-comparison process. In other words, when ego goal predominates, the criterion of evaluation is normative, and an individual feels successful and satisfied when he/she is evaluated by others as higher achiever than those in the reference group (Papaioannou & Goudas, 1999; Papaioannou, 1994) or performing equally well with less effort (Sarrazin & Famose, 1999). Furthermore, an ego-oriented individual believes that the achieved success is a consequence of her/his superior abilities, not the effort invested. Failure and negative emotions are experienced when an individual is evaluated as having lower abilities than others, which might lead to the avoidance of task or the demonstration of low effort, both used as an excuse for failure (Papaioannou, 1994). In an ego- or performance-oriented context, individuals perceive that poor performance and mistakes will be punished, that high-ability individuals will receive the most attention and recognition, and that competition between individuals (e.g. pupils, team members) is encouraged by the authority (e.g. coach, teacher) (Newton & Duda, 1999).

According to the goal perspective theory (Nicholls, 1989, in Newton & Duda, 1999), the characteristics of both a person and situation can interact and impact the state of goal involvement, which in turn results in achievement behaviours. Some researches tested this assumption in team sport, and confirmed that situational (coach leadership behaviour) and dispositional factors (athletes' goal orientation) explain a great amount of the variance of motivational climate (i.e.

Balaguer, Duda, Atienza, & Mayo, 2002; Barić, 2004). Therefore, many behavioural variations are possible, due to different individual perceptions of what is an appropriate goal within a particular social context. In general, personal goals influence the way people think, feel and act in achievement situations, such as competitive sport (Duda, 1993) and physical education classes (Papaioannou, 1994).

Several researches suggest that variation in goal perspectives is influenced by dispositional differences and situational factors (e.g. Seifriz, Duda & Chi, 1992, in Duda, 1993). Field studies (e.g. Ames, 1992; Ames & Archer, 1988, in Papaioannou, 1994) that were carried out in educational settings showed that environmental goal perspective or motivational climate is determined by teachers' and pupils' goals, the evaluation and reward process, the structure of the tasks to be performed (competitive-individualistic, easy-challenging) and by the fact how participants relate to each other in a particular setting. Drawing from this comprehension of classroom motivational climate, Papaioannou (1994) developed a *Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ)* to measure pupils' perceptions of achievement orientations in physical education. The results obtained by the original LAPOPECQ version showed that the instrument has satisfactory psychometric properties (see Papaioannou, 1994) and serves as a valuable tool for studying the effects of dispositional and situational differences on pupils' motivation and achievement in the context of physical education. The aim of this study was therefore to translate, adapt, test and verify the psychometric properties of Papaioannou's *Learning and Performance Orientations in Physical Education Classes Questionnaire* (1994) on a sample of Slovenian primary and secondary school pupils.

Method

Participants

171 pupils from Slovenian primary and secondary schools participated in this research, of whom 66 were boys (39%) and 105 girls (61%). 76 participants attended the seventh grade of primary school, and 95 attended the second grade of secondary school. They were between 12 and 17 years old (primary school: M_{age}=13.08 yrs, SD_{age}=0.42 yrs; secondary school: M_{age}=16.02 yrs, SD_{age}=0.36 yrs). All of the participating schools are in the urban areas of several cities in Slovenia.

Instruments

Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ; Papaioannou, 1994) was used for studying the learning and performance orientation in physical education classes. The instrument was developed on the basis of achievement motivation theories, with an emphasis on the goal perspective theory. In the present study, the solution of the questionnaire with 27 items was used. All items are responded on a five-point Likert-type scale (1 = strongly disagree, 5 = strongly agree).

LAPOPECQ consists of five factors (Papaioannou, 1994). The first factor (*Teacher-initiated learning orientation*; 6 items) indicates a learning-oriented climate that is created by teacher's behaviours, while the second factor (*Pupils' learning orientation*; 7 items) refers to a learning-oriented environment as a result of pupils' satisfaction with learning. The third factor (*Pupils' competitive orientation*) consists of 5 items referring to a climate in which success is defined by clear normative-based criteria of evaluation (i.e. perform better than others). The fourth factor

(*Outcome orientation without effort*), consisting of 4 items, indicates a climate in which success is defined by clear-ability based criteria of evaluation (i.e. outcome without effort). The final factor (*Pupils' worries about mistakes*; 5 items) suggests pupils' worries about mistakes. Papaioannou (1994) found that all factors have a significant internal reliability (see Table 6).

Procedure

Prior to the beginning of the study, written consents were obtained from participants' parents. The pupils were requested to think about their physical education classes and respond to 27 items of the instrument on the five-point Likert-type scale. The questionnaire was completed by pupils in a group setting in classroom and took approximately 15 minutes to complete. Factor analysis and internal consistency analysis were conducted to study the psychometric characteristics of LAPOPECQ.

Results

Although perceptions of motivational climate may differ by gender, factor analysis was made on the whole sample, due to the fact that the sub-sample of boys (n = 66) was small. The second reason for conducting the analysis on the whole sample regardless of pupils' gender lies in the fact that such an analysis enables a comparison with other similar studies (i.e. Papaioannou, 1994, 1998) using the same procedure.

Factor analysis

A principal component factor analysis, followed by varimax rotation, was conducted on the Slovenian version of the original 27-item LAPOPECQ version. Exploratory factor analysis (GK-criterion) resulted in a 7-factor structure, explaining 61.74% of variance (Table 1).

Table 1: Eigenvalues, percent of variance explained, cumulative percent of LAPOPECQ – exploratory factor analysis

Factor	Eigenvalue	% of total variance	Cumulative % of variance
1	5.448416	20.17932	20.17932
2	3.390114	12.55598	32.73530
3	2.326565	8.61691	41.35220
4	1.621516	6.00561	47.35782
5	1.533772	5.68064	53.03845
6	1.217546	4.50943	57.54788
7	1.133316	4.19747	61.74535

Since the results did not confirm Papaioannou's (1994) 5-factor structure, factor analysis was repeated by fixing the number of factors to 5 (see Table 2).

Table 2: Principal component factor analysis of LAPOPECQ, followed by a varimax rotation

Items	Factor 1 TEACHER	Factor 2 WORRIES	Factor 3 NORMATIVE	Factor 4 ABILITY	Factor 5 LEARNING
ITEM_1	**.594317**	.031436	-.029265	.165474	.105943
ITEM_5	**.265479**	-.279769	.147426	**.284544**	**.333029**
ITEM_6	**.722692**	.181889	-.074350	.015402	.183190
ITEM_10	**.499387**	-.191053	.138914	.002494	**.319224**
ITEM_11	**.526162**	-.216962	.231997	-.083022	.092653
ITEM_16	**.461020**	-.153549	.074592	.105641	**.417771**
ITEM_21	**.656182**	.244243	-.037934	-.035526	-.006403
ITEM_25	**.714998**	.084650	.031124	-.136094	.252569
ITEM_3	-.082212	**.696179**	.259376	.072364	.063904
ITEM_8	-.204263	**.646831**	.339525	.065636	.026782
ITEM_13	.275220	**.640811**	-.118719	.110239	.149555
ITEM_18	-.012417	**.709538**	.139653	.106500	.021776
ITEM_23	.281024	**.676479**	.233534	.053036	.080314
ITEM_2	.206841	.218190	**.725357**	.079242	.080054
ITEM_7	.038558	.218536	**.731987**	-.044505	.042352
ITEM_12	.009697	.320795	**.683585**	.059099	-.157140
ITEM_17	-.170645	-.176484	**.598977**	.285231	.337909
ITEM_22	.031428	.039583	**.495260**	.286360	.119197
ITEM_4	-.002521	-.174143	.238587	**.652604**	-.154971
ITEM_9	-.277982	.196297	.006919	**.668232**	.044956
ITEM_14	.331967	.251893	.090730	**.601323**	-.005654
ITEM_19	.030147	.162645	.056217	**.637148**	.203483
ITEM_15	.219151	.208031	-.101739	.095406	**.669020**
ITEM_20	.266106	.477112	-.089751	-.081905	**.590836**
ITEM_24	**.389699**	.167528	.020024	-.018349	**.553547**
ITEM_26	.185184	.039581	.055206	.141588	**.702477**
ITEM_27	-.005515	-.022672	.331439	-.103318	**.741114**

Legend (for Tables 2, 3, 4, 5, 6, 7):
Factor 1 (teacher) Teacher-initiated learning orientation;
Factor 2 (worries) Pupils' worries about mistakes;
Factor 3 (normative) Pupils' competitive orientation – normative-based criteria of evaluation;
Factor 4 (ability) Outcome orientation without effort – ability based criteria of evaluation;
Factor 5 (learning) Pupils' learning orientation – satisfaction with learning

Table 3: Eigenvalues, percent of variance explained, cumulative percent of LAPOPECQ – confirmatory factor analysis

Factor	Eigenvalue	% of total variance	Cumulative % of variance
1 – teacher	5.448416	20.17932	20.17932
2 – worries	3.390114	12.55598	32.73530
3 – normative	2.326565	8.61691	41.35220
4 – ability	1.621516	6.00561	47.35782
5 – learning	1.533772	5.68064	53.03845

The results of the varimax rotation showed that these 5 factors explained 53.04% of variance of the questionnaire items (see Table 3). A thorough analysis of items showed that the above stated 5-factor solution confirmed Papaioannou's model (1994, 1998) since 25 out of 27 items defined the same hypothetical factors as in the original questionnaire's solution. The first factor (8 items) was defined as the learning-oriented climate created by teachers' behaviours. The second factor (5 items) explained pupils' worries about the mistakes in the learning process, while the third one (5 items) described a motivational climate where success is defined by clear normative-based criteria of evaluation. The fourth factor (4 items) suggested a climate where achievement is defined by clear ability-based criteria of evaluation, and the last factor (5 items) implied a learning-oriented climate resulting from pupils' satisfaction with learning.

The comparison between the obtained factor solution and the one from the original Papaioannou's structure (1994) showed a relatively strong accordance. The item structure of three factors, namely worries about mistakes, competitive orientation (normative-based criteria of evaluation) and outcome orientation without effort (ability-based criteria of evaluation) was the same in both versions of the questionnaire. The results showed a different structure in other two factors (factor 1 and factor 5). Two items (item 5 and item 10), which in the original version belonged to the factor describing pupils' satisfaction with learning, were included in the factor describing teacher-initiated motivational climate in the Slovenian version of LAPOPECQ. The results of factor analysis also showed that three items (item 5, item 10, item 16 and item 24) are saturated with more than one factor (see Table 2). Due to this, further analyses were conducted.

The elimination of items 5 and 24 appears to be one of the most satisfactory moves for producing the clearest and simplest factor solution. The factor loadings of 25 items after the varimax rotation are shown in Table 4.

Table 4: Principal component factor analysis of the 25-item LAPOPECQ version, followed by a varimax rotation

	Factor 1 TEACHER	Factor 2 WORRIES	Factor 3 NORMATIVE	Factor 4 ABILITY	Factor 5 LEARNING
ITEM_1	**.588294**	.031018	-.019655	.201290	.115634
ITEM_6	**.725946**	.219272	-.087961	-.000679	.142371
ITEM_10	**.522958**	-.157499	.121723	-.040419	.316506
ITEM_11	**.532863**	-.212436	.235364	-.079097	.089318
ITEM_16	**.495466**	-.164849	.079411	.146646	**.418344**
ITEM_21	**.654069**	.251158	-.040190	-.036749	-.068552
ITEM_25	**.735229**	.098892	.021272	-.131997	.207423
ITEM_3	-.091243	**.688474**	.260229	.075847	.079559
ITEM_8	-.223314	**.638432**	.335168	.063139	.061916
ITEM_13	.262541	**.673517**	-.124051	.096230	.115682
ITEM_18	-.028407	**.718675**	.153799	.108002	-.018096
ITEM_23	.275425	**.687038**	.231035	.036774	.039680
ITEM_2	.195388	.221990	**.727607**	.079797	.065815
ITEM_7	.027544	.205046	**.728245**	-.018072	.050964
ITEM_12	.007466	.284091	**.700199**	.070855	-.155446
ITEM_17	-.152662	-.171795	**.587650**	.242990	.380332
ITEM_22	.025674	.043810	**.499286**	.264141	.103247
ITEM_4	-.012559	-.204431	.263177	**.661044**	-.122382
ITEM_9	-.287702	.165262	.028318	**.682572**	.060032
ITEM_14	.307925	.226508	.118546	**.637277**	-.044634
ITEM_19	.042000	.164581	.063163	**.601812**	.221403
ITEM_15	.270903	.212074	-.106533	.113651	**.645967**
ITEM_20	.291805	.482754	-.079356	-.032053	**.530061**
ITEM_26	.221132	.070027	.040198	.136124	**.721993**
ITEM_27	.048859	.007565	.304667	-.134728	**.745076**

Table 5: Eigenvalues, percent of variance explained, cumulative percent of the 25-item LAPOPECQ version

Factor	Eigenvalue	% of total variance	Cumulative % of variance
1 – teacher	5.027353	20.10941	20.10941
2 – worries	3.279298	13.11719	33.22660
3 – normative	2.201476	8.80590	42.03251
4 – ability	1.585791	6.34316	48.37567
5 – learning	1.490923	5.96369	54.33936

The results of the factor analysis of the 25-item LAPOPECQ version (see Tables 4 and 5) showed that all items were correlated with the single factor. The exception was item 16 which shared its correlation with two factors, namely factors 1 and 5. Due to the relatively high internal consistency of factor 1 (Cronbach's alpha is 0.77, see Table 6 for details), item 16 was left in the final solution of the questionnaire.

Reliability

The reliability of each LAPOPECQ scale was calculated using Cronbach's alpha coefficient. The observed coefficients and average inter-item correlation of the five factors are presented in Table 6.

Table 6: Reliability of LAPOPECQ scales

Factor	Cronbach's alpha; Papaioannou, 1994	Cronbach's alpha; 25-item Slovenian version	Average inter-item correlation; 25-item Slovenian version
1 – teacher	0.79	0.77	0.33
2 – worries	0.67	0.78	0.41
3 – normative	0.71	0.71	0.33
4 – ability	0.65	0.60	0.27
5 – learning	0.84	0.71	0.39

Cronbach's alpha coefficients show that four scales of the 25-item Slovenian LAPOPECQ version are highly reliable. If compared to such a high reliability, factor 4 describing motivational climate with clear-ability based criteria of evaluation appears to be the least reliable, with Cronbach's alpha standing at 0.60. The comparison of reliability between the original Greek version of LAPOPECQ (Papaioannou, 1994) and the 25-item Slovenian version presented in this article shows that factors 1, 4, and 5 in the Slovenian version are slightly less reliable than in the original version. The translation of the questionnaire appears to increase the reliability of factor describing pupils' worries about mistakes. In general, the results obtained in the present study confirmed the validity and reliability of LAPOPECQ.

Table 7: Descriptive statistics for the five factors of 25-item Slovenian LAPOPECQ version

Factor	number of items	N	M	Minimum	Maximum	SD
1 – teacher	7	160	26.04	11.00	35.00	4.87
2 – worries	5	161	16.30	7.00	25.00	4.47
3 – normative	5	161	14.14	5.00	25.00	4.14
4 – ability	4	162	11.46	4.00	20.00	3.22
5 – learning	4	158	14.38	6.00	20.00	3.14

Discussion

The purpose of this study was to examine the psychometric characteristics of the Slovenian version of LAPOPECQ and to describe the research efforts toward the adaptation of a questionnaire to measure perceptions of learning and performance orientations in physical education classes. The authors' motivation for the adaptation of this instrument stemmed from the need for such an inventory since there was no similar questionnaire in the Slovenian language for assessing motivational climate.

The results of a confirmatory factor analysis of the Slovenian version of LAPOPECQ confirmed the five-factor solution of Papaioannou's (1994) original Greek version. A clearer factor structure of the Slovenian version was achieved by eliminating two items. The Slovenian version of LAPOPECQ used in this study therefore has 25 items (compared to 27 in Papaioannou's original

version). Taking into consideration that the Slovenian version was actually translated from the English version of LAPOPECQ (i.e. from Greek to English and than to Slovenian) the closeness of fit between factor structures of both versions is even more significant.

As regards scales' reliability, examination of Cronbach's alpha coefficients showed that all five scales of the Slovenian version of LAPOPECQ were reliable. A relatively low reliability was seen only in the *Outcome orientation without effort* scale. Since this may be ascribed to the small number of items in the scale (only 4 items), any future development of the instrument should take this into consideration by adding new items.

This stable five-factor solution indicates the existence of two learning- and three performance-oriented factors. Two learning-oriented factors assess teacher-initiated learning orientation and pupils' learning orientation derived from satisfaction with learning. Three performance-oriented factors measure pupils' worries about the mistakes they make in the educational process, pupils' competitive orientation described through normative-based criteria of evaluation and pupils' outcome without effort orientation, deriving from ability-based criteria of evaluation. According to the goal perspective theory, learning orientation (i.e. task or mastery orientation) corresponds to a high level of intrinsic motivation (Duda, 1993; Duda, Chi, Newton, Walling, & Catley, 1995; Newton & Duda, 1999; Papaioannou, 1994, 1998). A higher value of intrinsic motivation can be associated with higher quality of performance (Goudas, 1998; Theboom, De Knop, & Wiess, 1995) and development of positive attitudes (Duda, Chi, Newton, Walling, & Catley, 1995; Papaioannou, 1994; Škof, Cecić Erpič, Zabukovec, & Boben, 2002). Since teacher plays a significant role in development of motivational climate, his/her role has to be emphasized by teaching him/her to develop such a climate.

This article provides data on the adaptation and development of a questionnaire measuring pupils' perceptions of motivational climate during physical education classes. The results showed that LAPOPECQ translated and adapted to the characteristics of physical education in the Slovenian environment is a valid and reliable instrument. It is metrically suitable for use in physical education classes in both primary and secondary schools. Undoubtedly, further improvement of this instrument is welcomed. It could be improved by addition of new items, especially to the scale consisting of 4 items only (*Outcome orientation without effort*).

Considering the obtained results together with the results of the previous studies (i.e. Duda, 1993; Nicholls, 1989; Papaioannou, 1994, 1998, 2000) it is necessary to underline the importance of task- or mastery-oriented climate in the physical education context. Since it is related to the personal improvement, exhibition of positive adaptive motivational patterns and maintaining pupils' motivation, its significance has to be emphasized. The present paper could therefore serve as a foundation for further investigations of the effects of dispositional and situational factors on pupils' motivation.

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